



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/701,284	11/28/2000	Hiroyuki Kyushima	107999	8940
25944	7590	11/17/2003	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			ZIMMERMAN, GLENN	
			ART UNIT	PAPER NUMBER
			2879	

DATE MAILED: 11/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/701,284

Applicant(s)

KYUSHIMA ET AL.

Examiner

Glenn Zimmerman

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 02 September 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other:

## **DETAILED ACTION**

### ***Allowable Subject Matter***

The indicated allowability of claims 5 and 9 is withdrawn in view of the newly discovered reference(s) to Kyushima et al. U.S. Patent 5,504,386. Rejections based on the newly cited reference(s) follow.

### ***Response to Amendment***

Amendment, filed on September 2, 2003, has been entered and acknowledged by the examiner.

### ***Drawings***

The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on September 2, 2003 have been approved.

### ***Claim Objections***

Claim 2 is objected to because of the following informalities: In claim 2 line 4, the examiner suggests changing "place" to - - plate - -. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 4-9 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Kyushima et al. U.S. Patent 5,504,386.

Regarding claim 4, Kyushima et al. disclose a photomultiplier tube **(title)** comprising a faceplate **(faceplate Fig. 2(b), 3(b) or 5(b) ref. 3)**;

a photocathode **(photocathode ref. 5)** for emitting electrons in response to light incident on the faceplate;

an electron multiplying section **(multiplier assembly ref. 8)**, disposed inside an airtight vessel **(col. 2 line 35)**, for multiplying the electrons emitted from the photocathode; and

an anode **(anode ref. 10)** for outputting an output signal based on the electrons multiplied by the electron multiplying section wherein the airtight vessel comprises;

a stem plate **(metal stem and metal annular portion ref. 4 and 11)** for fixedly supporting the electron multiplying section and the anode with stem pins;

a metal side tube **(metal sidewall ref. 2A)** with the stem plate fixed on one open end, and enclosing the electron multiplying section and the anode; and

a faceplate fixed **(faceplate ref. 3)** on the other open end of the metal side tube,

wherein the stem plate is welded (**col. 4 lines 36-38**) on the one open end of the metal side tube a top surface of the stem plate contacting a bottom end of the metal side tube such that an outer surface of the metal side tube is flush (**col. 4 lines 34-41; Fig. 3b**) with an edge surface of the stem plate, at least a portion of the top surface of the stem plate in contact with the metal side tube being formed of metal. There is an outer surface of the metal side tube that is clearly flush with an edge surface of the stem plate as can be seen in from Fig. 3(b).

Regarding claim 5, Kyushima et al. disclose the photomultiplier tube as recited in claim 4, wherein a cutout portion is formed in the top surface on an edge of the stem plate for supporting the bottom end of the metal side tube (**metal stem and metal annular portion ref. 4 and 11**). One can clearly see what looks like a cutout portion in the angular gap next to 4 and 11.

Regarding claim 6, Kyushima et al. disclose the photomultiplier tube as recited in claim 4, wherein the metal side tube is fusion welded (**col. 4 lines 36-38**) to the stem plate.

as to limitation fusion in claim 6, it is the process step incorporated into which renders the claim as a product-by-process.

the courts have been holding that: "- In spite of the fact that a product-by-process claim may recite only process limitation, it is the product which is covered by the claim and not the recited process steps- - . (In re Hughes, 182 USPQ 106) - -". Also - - Patentability of a claim to a product does not rest merely on a difference in the method by which that product is made. Rather, it is the product itself which must be

new and unobvious. (In re Pilkington, 162 USPQ 147) - -." Accordingly, "- - a rejection based on 35 U.S. C. section 102 or alternatively on 35 U.S. C. section 103 of the statute is eminently fair and acceptable." (In re Brown and Saffer, 173 USPQ 685 and 688). - -  
The determination of the patentability of product-by-process claim is based on the product itself rather than on the process by which the product is made- -. In re Thrope, 777 F. 2d 695, 227 USPQ 964 (Fed. Cir. 1985).

As such, no patentable weight is given to process steps recited in claim 6.

Regarding claim 7, Kyushima et al. disclose the photomultiplier tube as recited in claim 6, wherein the fusion welding (**col. 4 lines 36-38**) is laser welding or electron beam welding.

As to limitation wherein the fusion welding is laser welding or electron beam welding in claim 7, it is the process step incorporated into which renders the claim as a product-by-process.

The courts have been holding that: "- -In spite of the fact that a product-by-process claim may recite only process limitation, it is the product which is covered by the claim and not the recited process steps- -. (In re Hughes, 182 USPQ 106) - -". Also - - Patentability of a claim to a product does not rest merely on a difference in the method by which that product is made. Rather, it is the product itself which must be new and unobvious. (In re Pilkington, 162 USPQ 147) - -." Accordingly, "- - a rejection based on 35 U.S. C. section 102 or alternatively on 35 U.S. C. section 103 of the statute is eminently fair and acceptable." (In re Brown and Saffer, 173 USPQ 685 and 688). - -  
The determination of the patentability of product-by-process claim is based on the

product itself rather than on the process by which the product is made- -. In re Thrope, 777 F. 2d 695, 227 USPQ 964 (Fed. Cir. 1985).

As such, no patentable weight is given to process steps recited in claim 7.

Regarding claim 8, Kyushima et al. disclose the photomultiplier tube as recited in claim 4, wherein the entirety of the stem plate is formed of metal (**col. 7 line 60**).

Regarding claim 9, Kyushima et al. disclose the photomultiplier tube as recited in claim 4, wherein the stem plate comprises a metal stem support member (**metal annular portion Fig. 9b ref. 11**), and a glass stem plate (**Fig. 9b ref. 9A**), the metal stem support member being in contact with the bottom end of the metal side tube extending substantially in an axial direction of the metal side tube.

Regarding claim 12, Kyushima et al. discloses the photomultiplier tube of claim 4, wherein the metal side tube is shaped substantially like an angular cylinder (**cylindrical sidewall ref. 2A**). The examiner notes that the metal side tube is angular as it goes cylindrical with 360 degrees of angles. There is also an angular portion at the top (Fig. 2(b)) where reference 3 faceplate is located and an angular portion at the bottom where the flange and sealing area ref. 2b are located. This clearly is an angular cylinder.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 7 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kyushima et al. U.S. Patent 5,504,386 in view of Frederick et al. U.S. Patent 5,796,109.

Regarding claim 1, Kyushima et al. teaches a method of manufacturing a photomultiplier tube having a faceplate (**faceplate Fig. 5(b) ref. 3**), a photocathode (**photocathode ref. 5**) for emitting electrons in response to light incident on the faceplate, an electron multiplying section (**multiplier assembly ref. 8**) for multiplying the electrons emitted from the photocathode, an anode (**anode ref. 10**) for outputting an output signal based on the electrons multiplied by the electron multiplying section, a stem plate (**metal stem and metal annular portion ref. 4 and 11**) for fixedly supporting the electron multiplying section and the anode with stem pins, and a side tube (**metal cylindrical sidewall ref. 2A**) with the stem plate fixed on one open end and the faceplate fixed on the other open end and enclosing the electron multiplying section and the anode, the method comprising the steps of:

providing a metal side tube (**sidewall entirely metal Fig. 3b ref. 2A**) formed of metal and a stem plate (**metal stem and metal annual portion ref. 4 and 11 respectively**) such that at least a portion contacting the metal side tube is formed of metal; aligning the metal side tube with the stem plate (**col. 4 lines 34-41; Fig. 3b**) so that an outer edge of the stem plate does not protrude further externally than an outer surface of the metal side tube; and fusing the metal side tube to the stem plate at a point of contact between the metal side tube and the stem plate by welding to form an airtight seal (**col. 2 lines 35**), but fail to teach the use of laser welding or electron beam



welding. Frederick et al. in the analogous art teaches an electron beam step (**col. 16 lines 8-11**). Additionally, Frederick et al. teach incorporation of such an electron beam welding step to improve the hermetic seal (**col. 16 lines 8-11**).

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a electron beam welding step in the for the welding step of Kyushima et al. since such a modification would improve the hermetic seal as taught by Frederick et al.

Regarding claim 2, Frederick et al. in the analogous art teaches electron beam welding. The motivation for combination is the same as that in claim 1.

Regarding claim 3, Frederick et al. in the analogous art teaches electron beam welding. The motivation for combination is the same as that in claim 1.

Regarding claim 7, Frederick et al. in the analogous art teaches electron beam welding. The motivation for combination is the same as that in claim 1.

Regarding claim 11, Kyushima et al. discloses the method of claim 1, wherein the metal side tube is shaped substantially like an angular cylinder (**cylindrical sidewall ref. 2A**). The examiner notes that the metal side tube is angular as it goes cylindrical with 360 degrees of angles. There is also an angular portion at the top (Fig. 2(b)) where reference 3 faceplate is located and an angular portion at the bottom where the flange and sealing area ref. 2b are located. This clearly is an angular cylinder.

Claim 4, 6, 8 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sawai et al. U.S. Patent 5,594,301 in view of Kyushima et al. U.S. Patent 5,504,386.

Regarding claim 4, Sawai et al. teaches a photomultiplier tube (**Fig. 4**) comprising a faceplate (**quartz faceplate ref. 5**);

a photocathode (**ref. 6 photocathode**) for emitting electrons in response to light incident on the faceplate;

an electron multiplying section (**dynode ref. 7**), disposed inside an airtight vessel (**col. 1 line 60**), for multiplying the electrons emitted from the photocathode; and

an anode (**anode ref. 8**) for outputting an output signal based on the electrons multiplied by the electron multiplying section wherein the airtight vessel comprises;

a stem plate (**borosilicate stem plate**) for fixedly supporting the electron multiplying section and the anode with stem pins;

a metal side tube (**Kovar cylinder integral ref. 1; col. 4 lines 25-30**) with the stem plate fixed on one open end, and enclosing the electron multiplying section and the anode; and

a faceplate fixed (**quartz faceplate ref. 5**) on the other open end of the metal side tube,

wherein a top surface of the stem plate contacting a bottom end of the metal side tube such that an outer surface of the metal side tube is flush (**Fig. 4 ref. 2 and 12**) with an edge surface of the stem plate, at least a portion of the top surface of the stem plate in contact with the metal side tube being formed of metal, but fails to teach wherein the stem plate is welded on the one open end of the metal side tube. Kyushima et al. in the analogous art teaches the metal stem plate (**col. 4 lines 34-37; col. 7 line 60**) is welded on the one open end of the metal side tube (**abstract**). Additionally,

Kyushima et al. teaches incorporation of such a welding the stem plate to the metal side tube to improve the vacuum seal (**col. 4 lines 44-45**).

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a metal stem plate welded on the open end of the metal side tube in the photomultiplier of Sawai et al. since such a modification would improve the vacuum seal as taught by Kyushima et al.

Regarding claim 6, Kyushima et al. in the analogous art teaches fusion welding (**col. 4 lines 35-40**). The motivation for combination is the same as that in claim 4.

Regarding claim 8, Kyushima in the analogous art teaches wherein the entirety of the stem plate is formed of metal (**col. 4 lines 34-37; col. 7 line 60**). The motivation for combination is the same as that in claim 4.

Regarding claim 12, Sawai et al. discloses the photomultiplier tube of claim 4, wherein the metal side tube is shaped substantially like an angular cylinder (**Kovar cylinder ref. 1**). The examiner notes that when one looks at Fig. 4 ref. 11 and 12 of the cylinder that there are angles there that make this an angular cylinder.

Claims 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. U.S. Patent 4,221,967 in view of Kyushima et al. U.S. Patent 5,504,386.

Regarding claim 10, Wang et al. teach a radiation detector (**title**) comprising: a scintillator (**scintillation screen Fig. 1 ref. 24**) for emitting fluorescent (**output phosphor screen ref. 46**) light in response to radiation generated from an object of analysis;

a plurality of photomultiplier tubes (**photomultiplier tubes ref. 50**), each having a faceplate (**glass output window ref. 30**) disposed in opposition to the scintillator, for outputting electric charges based on fluorescent light emitted from the scintillator; and

a position calculating section (**position network ref. 52**) for performing calculations on the electric charges output from the plurality of photomultiplier tubes and outputting positioning signals of radiation issued in the object of analysis, but fails to teach a photomultiplier tube comprises: a photocathode for emitting electrons in response to light incident on the faceplate; an electron multiplying section, disposed inside an airtight vessel, for multiplying the electrons emitted from the photocathode; and

an anode for outputting an output signal based on the electrons multiplied by the electron multiplying section, and wherein

the airtight vessel comprises;

a metal stem plate for fixedly supporting the electron multiplying section and the anode with stem pins;

a metal side tube with the metal stem plate fixed on one open end, and enclosing the electron multiplying section and the anode, wherein the metal stem plate is fixed by welding to the metal side tube such that an outer surface of the metal side tube is flush with an edge surface of the stem plate and the face plate fixed on the other open end of the metal side tube. Kyushima et al. in the analogous art teach wherein each of the plurality of the photomultiplier (**title**) tubes comprises: a photocathode (**photocathode Fig. 4b ref. 5**) for emitting electrons in response to light incident on the faceplate; an

electron multiplying section (**multiplier section ref. 8**), disposed inside an airtight vessel (**col. 2 line 35**), for multiplying the electrons emitted from the photocathode; and an anode (**anode ref. 10**) for outputting an output signal based on the electrons multiplied by the electron multiplying section, and wherein

the airtight vessel comprises;

a metal stem plate (**metal stem ref. 4**) for fixedly supporting the electron multiplying section and the anode with stem pins (**stem leads ref. 6**);

a metal side tube (**metal side wall ref. 2a**) with the metal stem plate fixed on one open end, and enclosing the electron multiplying section and the anode, wherein the metal stem plate is fixed by welding to the metal side tube such that an outer surface of the metal side tube is flush (**col. 4 lines 34-41; Fig. 3b**) with an edge surface of the stem plate and the face plated fixed on the other open end of the metal side tube.

Additionally, Kyushima et al. teaches incorporation of such a photomultiplier tube to obtain a large decrease in manufacture time, prevent generation of gas within the envelope, prevent deterioration of the electron multiplier assembly (dynodes) and greatly reduce noise (**abstract**).

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use the photomultiplier of Kyushima et al. in the gamma ray camera of Wang et al. since such a modification would obtain a large decrease in manufacture time, prevent generation of gas within the envelope, prevent deterioration of the electron multiplier assembly (dynodes) and greatly reduce noise as taught by Kyushima et al.

Regarding claim 13, Kyushima et al. discloses photomultiplier tube of claim 10, wherein the metal side tube is shaped substantially like an angular cylinder (**cylindrical sidewall ref. 2A**). The examiner notes that the metal side tube is angular as it goes cylindrical with 360 degrees of angles. There is also an angular portion at the top (Fig. 2(b)) where reference 3 faceplate is located and an angular portion at the bottom where the flange and sealing area ref. 2b are located. This clearly is an angular cylinder.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

The examiner has rejected the claims with Kyushima et al. U.S. Patent 5,504,386 as 102 or 103. The examiner notes that there is an outer surface of the metal side tube (i.e. the flange outer surface, which is part of the tube) that is flush with an edge surface of the stem plate. The examiner notes that the part of the flange at the tip of the flange is still an outer surface of the metal side tube. The figure 2b clearly shows that the two surfaces are flush. The examiner urges the applicant to address the outer surface of the flange in Kyushima et al, which is clearly part of the metal tube and an outer surface of the metal tube, as the outer surface of the flange is clearly open to the outside of the photomultiplier just as much as the 2A portion of the tube is open to the outer surface of the photomultiplier. The applicant has asserted that in the rejection to claim 5 that there is no cutout. The examiner notes that cutout hints of the process of cutting. However a

process of cutting is not given patentable weight because processes are not given weight in a product claim.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Glenn Zimmerman whose telephone number is (703) 308-8991. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is n/a.

  
Glenn Zimmerman

Joseph Williams  
